

11-21-00

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Attorney's Docket No. USG 3368

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

JC945 U.S. PTO
09/116392
11/20/00

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of inventor(s):

Thomas G. Houman, Richard B. Stevens, Therese A. Fults and Timothy G. Kenny

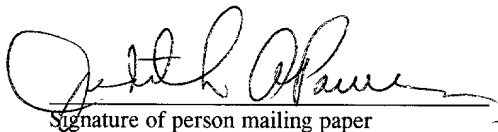
WARNING: Patent must be applied for in the name(s) of all of the actual inventor(s). 37 CFR §1.41(a) and §1.53(b).
For (title):

ABUSE-RESISTANT SKIM COATING COMPOSITION

CERTIFICATION UNDER 37 CFR §1.10

I hereby certify that this New Application Transmittal and the documents referred to as enclosed therein are being deposited with the United States Postal Service on this date, November 20, 2000, in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EE720389147US, addressed to: Box PATENT APPLICATION, Commissioner of Patents and Trademarks, Washington, D.C. 20231.

JUDITH A. POWERS
Type or print name of person mailing paper


Signature of person mailing paper

NOTE: Each paper or fee referred to as enclosed herein has the number of the "Express Mail" mailing label placed thereon prior to mailing. 37-CFR §1.10(b).

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 CFR §1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

1. **Type of Application** This new application is for a(n)
(*check* one applicable item below)

☒ Original (non-provisional)

☐ Design

☐ Plant

WARNING., Do not use this transmittal for a completion in the U.S of an International Application under 35 U.S.C. §371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

WARNING: Do not use this transmittal for the filing of a provisional application.

NOTE.- If one of the following 3 items apply then complete and attach **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED** and a **NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION**.

☐ Divisional.

☐ Continuation.

☐ Continuation-in-part (C-1-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C, 119(e), 120, of 121)

NOTE.- If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED**.

WARNING., If an application claims the benefit of the filing date of an earlier filed application under 35 U. S.C 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

WARNING., When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any non-provisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. 1.78(a)(3).

☐ The new application being transmitted claims the benefit of prior U.S. application(s) and enclosed are **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED**.

3. Papers Enclosed That Are Required for Filing Date under 37 CFR 1.53(b)
(Regular) or 37 CFR 1.153 (Design) Application

28 Pages of specification

4 Pages of claims

1 Pages of Abstract

2 Sheets of drawing

☒ formal

☐ informal

WARNING: *DO NOT* submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. Comments on proposed new 37 CFR 1.84. Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/16 inch) down from the top of the page." 37 C.F.R. 1.84(c)).

(complete the following, if applicable)

- ☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. 1.84(b).

4. Additional papers enclosed

- ☐ Preliminary Amendment
- ☐ Information Disclosure Statement (37 CFR 1.98)
- ☐ Form PTO-1449
- ☐ Citations
- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining hereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☐ Other

5. Declaration or oath

☒ Enclosed

Executed by

(check all applicable boxes)

☒ inventor(s).

- ☐ legal representative of inventor(s). 37 CFR 1.42 or 1.43.
- ☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

- ☐ This is the petition required by 37 CFR 1.47 and the statement required by 37 CFR 1.47 is also attached. See item 13 below for fee.

☐ Not Enclosed.

WARNING: Where the filing is a completion in the U.S. of an International Application, but where a declaration is not available, or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL, WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☐ Application is made by a person authorized under 37 CFR 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 CFR 1.16(e) can be filed subsequently).

NOTE: It is important that all the correct inventor(s) are named for filing under 37 CFR 1.41(c) and 1.53(b).

☐ Showing that the filing is authorized.

(not required unless called into question. 37 CFR 1.41(d))

6. Inventorship Statement

WARNING:: *If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted*

The Inventorship for all the claims in this application are:

☒ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE., An application including a signed oath or declaration may be filed in a language other than English. A verified English translation of the non-English language application and the processing fee of \$130.00 required by 37 CFR 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 CFR 1.52(d).

NOTE., A non-English oath or declaration in the form provided or approved by the PTO need not be translated. 37 CFR 1.69(b).

☒ English

☐ Non-English

☐ The attached translation is a verified translation. 37 CFR 1.52(d).

8. Assignment

☒ An assignment of the invention to United States Gypsum Company.

☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☒ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 CFR 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, (1150 O.G. 62-64)

9. **Certified Copy**

Certified copy(ies) of application(s)

| | | |
|---------|------------|-------|
| country | appln. no. | filed |
| country | appln. no. | filed |
| country | appin. no. | filed |

from which priority is claimed

☐ is (are) attached.

☐ will follow.

NOTE The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 CFR 1.55(a) and 1.63.

NOTE This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. **Fee Calculation (37 CFR 1.16)**

A. ☒ Regular application

CLAIMS AS FILED

| Number filed | Number Extra | Rate | Basic Fee 37 CFR 1.16(a) \$710.00 |
|--|--------------|------|---|
| Total | | | |
| Claims (37 CFR 1.16(c)) 17 - 20 = 0 x \$ 18.00 = | | | \$00.00 |
| Independent | | | |
| Claims (37 CFR 1.16(b)) 1 - 3 = 0 x \$ 80.00 | | | \$ 00.00 |
| Multiple dependent claim(s), if any (37 CFR 1.16(d)) 0 0 x \$270.00 | | | |

☐ Amendment canceling extra claims enclosed.

☐ Amendment deleting multiple-dependencies enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims canceled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 CFR 1.16(d).

Filing Fee Calculation

\$710.00

B. ☐ Design application

(\$310.00-37 CFR 1.16(g))

Filing Fee Calculation

\$

C. ☐ Plant application

(\$510.00-37 CFR 1.16(g))

Filing Fee Calculation

\$

11. Small Entity Statement(s)

☐ Verified Statement(s) that this is a filing by a small entity under 37 CFR 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. A nonprovisional application claiming benefit under 35 U.S.C. 119(e), 120, 121 or 365(c) of a prior application may rely on a verified statement filed in the prior application if the nonprovisional application includes a reference to a verified statement in the prior application or includes a copy of the verified statement filed in the prior application if status as a small entity is still proper and desired." 37 C.F.P. 1.28(a).

(complete the following, if applicable)

☐ Status as a small entity was claimed in prior application

_____/_____, filed on _____, from which benefit is being claimed for this application under:

☐ 35 U.S.C.119(e),

☐ 35 U.S.C.120,

☐ 35 U.S.C.121,

☐ 35 U.S.C.365[®],

and from which status as a small entity is still proper and desired.

☐ A copy of the verified statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$

NOTE: Any excess of the full fee paid will be refunded if a verified statement and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendible under §1. 136. 37 CFR 1. 28(a).

12. Request for International-Type Search (37 CFR 1.104(d))

(Complete, if applicable)

☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time.

(This and the surcharge required by 37 CFR 1.16(e) can be paid subsequently.)

☒ Enclosed

☒ Basic filing fee \$710.00

☐ Recording assignment

(\$40.00; 37 CFR 1.21(h))

(See attached "COVER SHEET FOR

ASSIGNMENT ACCOMPANYING NEW APPLICATION".) \$

☐ Petition fee for filing by other than all the inventors or person on behalf of the inventor where inventor refused to sign or cannot be reached.

(\$130.00; 37 CFR 1.47 and 1.17(h)) \$

☐ For processing an application with a specification in

a non-English language. (\$130.00; 37 CFR 1.52(d) and 1.17(k)) \$

☐ Processing and retention fee

(\$130.00; 37 CFR 1.53(d) and 1.21(l)) \$

☐ Fee for international-type search report

(\$40.00; 37 CFR 1.21(e)) \$

NOTE: 37 CFR 1.210) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 CFR 1.53(d) and this, as well as the changes to 37 CFR 1.53 and 1.78, indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of 1.21(l) must be paid, within 1 year from notification under 53(d).

Total fees enclosed

\$710.00

14. Method of Payment of Fees

☐ Check in the amount of

☒ Charge Account No. 21-0425 in the amount of \$710.00

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37CFR 1.22(b).

15. Authorization to Charge Additional Fees

WARNING:- If no fees are to be paid on filing, the following items should not be completed.

WARNING:- Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No.21-0425

☒ 37 CFR 1.16(a), (f) or (g) (filing fees)

☒ 37 CFR 1.16(b), (c) and (d) (presentation of extra claims)

NOTE. Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims canceled by amendment prior to the expiration of the time period set by the PTO in any notice of fee deficiency (37 CFR 1.16(d)), it might be best not to authorize the PTO to charge additional fees, except possibly when dealing with amendments after final action.

☐ 37 CFR 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☐ 37 CFR 1.17 (application processing fees)

WARNING: While 37CFR 1.17(a), (b), (d) deal with extensions of time under § 1.136(a), this authorization should be made only with the knowledge that, 'Submission of the appropriate extension fee under 37C.F.R. 1.136(a) is to no avail unless a request or petition for extension is filed.' (Emphasis added). Notice of April 5, 1985 (1060 O.G. 27).

☐ 37CFR 1.18 (issue fee at or before mailing of Notice of Allowance pursuant to 37 CFR 1.311 (b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the Notice of allowance. 37 CFR 1.311(b),

NOTE: 37 CFR 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application ... prior to paying or at the time of paying ... issue fee." From the wording of 37 CFR 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than as a small entity and (b) no notification is required if the change is to another small entity.

16. Instructions as to Overpayment

☒ Credit Account No. 21-0425

☐ Refund



SIGNATURE OF ATTORNEY

David F. Janci, Esq.
Registration No. 25,620
USG Corporation
Research Center
700 North Highway 45
Libertyville, IL 60048

☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-1-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

☐ **Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed**

Number of pages added

☐ **Plus Added Pages for Papers Referred to in Item 4 Above**

Number of pages added

☐ **Plus "Assignment Cover Letter Accompanying New Application"**

Number of pages added

☐ **Statement Where No Further Pages Added**

(If no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item.)

X This transmittal ends with this page.

ABUSE RESISTANT SKIM COATING COMPOSITION

FIELD OF INVENTION

- 5 The present invention relates to a ready-to-use self-gauging coating compound containing about 65% - 75% solids that provides a flat finely textured finish with improved abuse (abrasion) resistance properties. More specifically, the coating composition of the present invention comprises a resin binder in which there is dispersed an
- 10 aggregate consisting of particles in a selected size range in a quantity sufficient to form a layer of particles on the substrate that is equal to, but not exceeding the size of the largest particles. This coating offers an enhanced wall finish that can easily be decorated with paint.

15 BACKGROUND

- The current state of the Drywall Finishing Industry requires intensive labor to achieve a smooth final wall appearance. Even when a smooth wall has been produced using traditional finishing compounds, the walls are subject to damage from nicks, dings,
- 20 scratches scrapes and dents.

 The present invention provides a composition to easily achieve a flat, defect free wall surface and provide the additional advantage of dramatically improved abuse resistance. The coating composition of

the present invention provides the user with a self-gauging, smoothing coating compound that can be applied to the wall with a trowel or roller and floated smooth. Alternatively, this coating may spray applied.

5 SUMMARY OF INVENTION

The present invention relates to a ready-to-use, self-gauging coating compound that provides a flat finely textured finish with improved abuse (abrasion) resistance properties. The coating composition of the present invention comprises a resin binder in which

10 there is dispersed an aggregate consisting of particles in a selected size range in a quantity sufficient to form a layer of particles on the substrate that is one particle deep. Preferably, the relatively large aggregate particles in the layer are closely spaced, with the finer particles of filler taking up the interstitial space. The abuse resistance

15 tests, as determined by ASTM D4977 (modified), show the compositions of the present invention survive from 200 to 1000 cycles, and can be extended to as many as 5000 cycles, as compared to unpainted gypsum drywall that typically fails after 20 to 30 cycles.

The coating of the present invention may be applied over newly

20 installed commercial wallboard such as SHEETROCK® Brand Gypsum Panels, abuse resistant wallboard such as SHEETROCK® Brand Gypsum Panels, Abuse-Resistant, and gypsum/fiber board such as FIBEROCK® Brand Panels, to meet the Gypsum Association

is a high -solids, high latex formulation, which contains specific sized aggregate that acts as a gauge or screed. It has been found that a self-gauging coating compound can be formed by adding an aggregate having a specially selected size particles to compositions that are similar to joint compound formulations. The self-gauging nature of the present invention provides for a uniform thickness of coating over the wall surface, improving the uniformity of appearance for the wall, and also the ability of the coating to provide abuse resistance. Application of too little or too much coating would degrade appearance and abuse resistance. Thus the screeding nature of these compositions result in a more limited skill level required to achieve an even finished appearance as well as proper function. This is especially important when using the chemically setting base to ensure that the base has sufficient thickness and water retention to chemically set. The controlled depth feature also facilitates smoothing the surface with a float, resulting in an attractive, uniform appearance, while ensuring proper coating thickness and aggregate density for dramatically enhanced abrasion resistance. In the preferred embodiment, the coating composition of the present invention comprises a resin binder in which there is dispersed aggregate particles passing a 30-mesh screen and retained on a 50-mesh screen. The preferred aggregate for the abuse resistant coating composition of the present invention is silica sand.

The coating composition may be applied either by roller, or by trowel or it may be spray applied. The coating compositions may be either a drying type (with a calcium carbonate filler) or a setting type (with a calcium sulfate hemi-hydrate base).

5

DESCRIPTION OF DRAWINGS

In order that the invention may be more readily understood, including the preferred embodiments of the invention, reference is made to the drawings, in which:

10 Figure 1 is a graph of the relationship between the concentration of sand aggregate in a coating composition and the ease of application of the coating.

15 Figure 2 is a graph of the relationship between the concentration of sand aggregate in a coating composition and the abuse resistance of the coating;

Figure 3 is a graph of the relationship between resin concentration in a coating composition and the ease of application of the coating; and

20 Figure 4 is a graph of the relationship between resin concentration in a coating composition and the abuse resistance of the coating.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

The coating composition of the present invention comprises a resin binder in which there is dispersed an aggregate consisting of particles in a selected size range in a quantity sufficient to form a layer or matrix film of particles on the substrate that is one particle deep.

The self-gauging coating composition of the present invention is a high solids, high latex formulation which contains specific sized aggregate that acts as a gauge or screed. It has been found that a self-gauging coating compound can be formed by adding a special type of aggregate having a specially controlled size to compositions that are similar to joint compound formulations.

The coating composition of the present invention comprises a resin binder in which there is dispersed a quantity of aggregate of particles passing a 30 mesh (11 mesh/cm) screen and retained on a 50 mesh (20 mesh/cm) screen to sufficient form a matrix or film of particles that is one particle deep. The coating compositions of the present invention produce coatings have an average thickness of from about 0.020 inches (508 microns) to about 0.050 inches (1270 microns) and have from 200 to about 1000 particles per square inch (31 to 155 particles per square centimeter). The thickness of the installed coating and the resulting abuse-resistance varies somewhat depending upon the substrate coated. Standard abuse resistance tests using a wire brush scrub to measure surface damage (ASTM

D4977 modified) produce results from 200 to 1000 cycles, and can be extended to as many as 5000 cycles as compared to unpainted gypsum drywall that typically lasts for 20 to 30 cycles.

5 AGGREGATE

The aggregate that is a component of the coating composition is preferably a silica sand. The sand or other equivalent aggregate may be, generally characterized as a fine grade of aggregate, i.e. in which substantially all of the particles pass through a No. 30 (11 mesh/cm) U.S. Standard sieve screen and in which substantially all of the particles are retained on a No. 50 (20 mesh/cm) US Standard sieve screen. Other types of fine aggregate that are functionally equivalent to the fine silica sand, such as limestone, may also be used in the coating composition, either in place of fine silica sand or in combination with fine silica sand. Particle size control is important for uniform troweling and float finishing. Aggregates that do not have a particle size within these tight tolerances give poor troweling and float finishing properties, resulting in unsightly surface defects such as streaks and gouges. Use of aggregate within this particle size range insures an even uniform appearance and depth of coating.

The preferred aggregate for the abuse resistant coating composition is Wedron Washed Silica Sand Frac San 30-50. The 30-50 is a standard designation essentially specifying 90% minus 30

mesh (11 mesh/cm) and 90% plus 50 mesh (20 mesh/cm).

Alternatively, the aggregate may be a limestone having a similar range of particle sizes, 99% minus 30 mesh (11 mesh/cm) and 80% plus 50 mesh (20 mesh/cm).

- 5 The fine sand or other functionally equivalent aggregate should be present in the coating composition of this invention in a quantity sufficient to form an applied layer or matrix of aggregate particles one particle thick. Within that layer, the aggregate should be closely spaced. It has been found that coatings that have a particle count of
- 10 200 to 1000 particles per square inch (31 to 155 particles per square centimeter) and preferably 450 to 650 particles per square inch (70 to 101 particles per square centimeter), using 30-50 sand aggregate, provide improved abuse resistance.

- Generally the desired particle count for the float finish
- 15 compositions require from about 7.5 to about 75 wt % of aggregate, preferably about 18 to about 49 wt % of aggregate, and most preferably, about 25 to about 35 wt % of aggregate, based on the weight of the dry coating composition. Spray finish compositions require a different range, from about 10-75 wt % of aggregate,
- 20 preferably about 30-55 wt % of aggregate, and most preferably 35-50 wt % of aggregate, based on the dry weight of the composition.

The coating compositions of the present invention must include a resin that functions as a binder. Two principal classes of latex resin binders that have been used are polyvinyl acetate homopolymers and ethylenevinyl acetate copolymers. Vinyl acrylics binders also may be used.

10

| Product | Supplier | % solids |
|--------------------|---------------------------------------|----------|
| Halltech 41-355 | Halltech, Inc. | 58 % |
| Wallpol CPS 104 | Reichhold | 60 % |
| Dur-o-set CP 1050 | National Starch and Chemical Corp. | 58 % |
| Fullatex PD-722 | H.B. Fuller | 60 % |
| Halltech HP 19-39M | Halltech, Inc. | 59 % |
| Project R575E | SPI | 60 % |

The coating compositions of the present invention may use the following ethylene vinyl acetate copolymers (but would not be limited to only these specific examples).

| Product | Supplier | % solids |
|------------------|------------------------------------|----------|
| Airbond 526BP | Air Products and Chemicals | 55 % |
| Dur-o-set CP1214 | National Starch and Chemical Corp. | 55 % |
| CPS 743 | Reichhold | 60 % |

9

The coating compositions of the present invention preferably include sufficient filler to fill the interstitial spaces between the aggregate particles. The filler also provides cover for the coating compositions and in the case of setting compositions; the calcium sulfate filler provides the setting binder. Other materials that are preferably used are mica, talc clay and cellulose thickeners.

APPLICATION

The coating compositions of the present invention may be applied by either roller or trowel and smoothed with a float or they may be spray applied to wall surfaces. When smoothing with a trowel or float, the aggregate acts as a screed controlling the thickness and evenness of the finish so that a limited skill level is needed to achieve an even appearance. Standard scrub tests with a wire brush measuring surface damage (ASTM D4977 modified) have produced results from 200 cycles (drying types) to 1000 cycles, and the technology is capable of producing resistance to 5000 cycles.

COMPOSITIONS

The abuse resistant coating compositions that are setting type, designed for float finishing, fall within the parameters shown in Table 2. The compositions are shown as weight percentage on a dry basis.

TABLE 2

| Component | Useable Range | Preferred Range | Most preferred |
|------------------------------------|----------------------|------------------------|-----------------------|
| Silica Sand 30-50 mesh aggregate | 7.5 – 55 | 18 - 48 | 30.18 |
| Resin | 2.5 – 12 | 3 - 9 | 7.78 |
| Calcium sulfate hemihydrate filler | 40 – 85 | 44 - 71 | 57 |
| Mica | 0 – 10 | 1.3 – 2.1 | 1.68 |
| Attapulugus clay | 1 – 5 | 1.9 – 3.1 | 2.51 |
| Set preventer | 0.1 – 0.6 | 0.21 – 0.33 | 0.27 |
| pH Adjuster | 0 – 2 | 0.05 – 0.08 | 0.07 |
| Cellulose thickener | 0.15 – 1.0 | 0.26 – 0.41 | 0.34 |
| Preservative | 0.15 – 0.2 | 0.15 – 0.2 | 0.17 |

Compositions of this type chemically set and harden into

- 5 calcium sulfate dihydrate by addition of a set initiator, added at the rate of 4.9 grams of set initiator per 100 grams of coating. The best combinations of abuse resistance and application properties are achieved by using a relatively large proportion of aggregate and a relatively large proportion of resin.

- 10 The abuse resistant coating compositions that are drying type, designed for float finishing, fall within the parameters shown in Table

3. The compositions are shown as weight percentage on a dry basis.

TABLE 3

| Component | Useable Range | Preferred Range | Most preferred |
|----------------------------------|----------------------|------------------------|-----------------------|
| Silica Sand 30-50 mesh aggregate | 7.5 – 75 | 18.5 – 49 | 31.26 |
| Resin | 2.5 – 12 | 3 – 9 | 7.25 |
| Calcium carbonate filler | 20 – 85 | 37 – 60 | 48.45 |
| Mica | 0 - 10 | 2.4 – 3.9 | 3.13 |
| Talc | 0 - 10 | 6 – 9.7 | 7.81 |
| Attapulugus clay | 1 – 5 | 1.2 – 1.95 | 1.56 |
| Cellulose thickener | 0.15 – 1.0 | 0.36 – 0.58 | 0.47 |
| Preservative | 0.15 – 0.1 | 0.05 – 0.08 | 0.06 |

The abuse resistant coating compositions that are drying type, designed to be applied by spraying, fall within the parameters shown in Table 4. The compositions are shown as weight percentage on a dry basis.

TABLE 4

| Component | Useable Range | Preferred Range | Most preferred |
|--|----------------------|------------------------|-----------------------|
| Calcium carbonate 30-50 mesh aggregate | 10 – 75 | 30 – 55 | 43.59 |
| Resin | 2.5 – 15 | 5 – 10 | 6.15 |
| Calcium carbonate filler | 10 – 75 | 30 – 55 | 49.54 |
| pH Adjuster | 0 – 0.4 | 0.15 – 0.30 | 1.2 |
| Cellulose thickener | 0.15 – 1.0 | 0.2 – 0.6 | 0.41 |
| Preservative | 0.05 – 0.15 | 0.05 – 0.15 | 0.01 |

EXAMPLES

- 5 The following examples will serve to illustrate the preparation of several abuse resistant coating compositions within the scope of the present invention. It is understood that these examples are set forth for illustrative purposes and that many other compositions are within the scope of the present invention. Those skilled in the art will
- 10 recognize that similar coating compositions may be prepared using other quantities of materials and equivalent species of materials than those illustrated below.

EXAMPLE 1

- 15 An abuse resistant coating composition of the setting type for

float application was prepared in accordance with the formulation shown in Table 5.

TABLE 5:

| Component | Pounds (Wet) | Pounds (Dry) | Percent (Dry) |
|------------------------------------|-------------------------|-------------------------|----------------------|
| Silica Sand 30-50 mesh Aggregate | 450 (205 kg) | 450 (205 kg) | 18.62 |
| Resin | 200 (91 kg) | 116 (53 kg) | 4.8 |
| Calcium sulfate hemihydrate filler | 1700 (773 kg) | 1700 (773 kg) | 70.36 |
| Mica | 50 (23 kg) | 50 (23 kg) | 2.07 |
| Attapulugus clay | 75 (34 kg) | 75 (34 kg) | 3.10 |
| Set Preventer | 8 (3.6 kg) | 8 (3.6 kg) | 0.33 |
| pH Adjuster | 2 (0.91 kg) | 2 (0.91 kg) | 0.08 |
| Cellulose thickener | 10 (4.5 kg) | 10 (4.5 kg) | 0.41 |
| Preservative | 5.2 (2.4 kg) | 5.2 (2.4 kg) | 0.21 |
| Water | 742 (337 kg) | | |
| Total Weight | 3242.2 (1474 kg) | 2416.2 (1098 kg) | 99.98 |

5

The Silica Sand 30-50 mesh aggregate was Wedron Silica Sand 30-50, sold by Fairmount Minerals that contains 90% of the particles between the designated screen sizes.

5 The mica was P80F Mica that is sold by United States Gypsum Co.

The attapulqus clay was Super Gel B sold by Milwhite.

10 The pH adjuster was citric acid.

The preservative was a mixture of 2 parts by weight of Troysan 174, 2 parts by weight of Fungitrol 158 and 1.2 parts by weight of

The composition was prepared by blending the water, preservatives with a premixed solution of set preventer, pH adjuster and water. Dry ingredients were added to liquid fraction and blended for 5 minutes using a Hobart mixer. Sufficient water was added to achieve a viscosity of 400-500 Brabender Units (B.U.; as measured with a Pin Type Sensor using a Brabender Viscocorder equipped with a 250 cmg head). The product was packaged and set aside until time of use.

5 47.29% water, 23.63% gypsum, 23.63% zinc sulfate, and 5.45%
attapulgius clay.

panels, smoothed using a plastic float and allowed to dry for 1 week. When dry, the coating had an average thickness of 0.037 inches (940 microns). Film thickness is determined by holding a metal bar tightly against the coated substrate, measuring the distance from the substrate to the metal bar. Thus film thickness is a measurement from the substrate to a plane created by the tips of the largest particles in the film. There were about 450 to 650 aggregate particles per square inch (70 to 101 particles per square centimeter).

20 mechanical device used to scrub a wire brush (of a type available for
this purpose from 3M) under a load of 27.5 pounds (12.5 kg) back and
forth over the surface of the test panels until the surface of the test
panel showed damage that could not be concealed by paint. This

level of abuse (abrasion) damage is given as the number of cycles (a cycle is one back and forth motion). Compositions of the type shown in Example 1 when applied to a FIBEROCK® substrate generated cycles of abrasion resistance in the range of 540 to 900 cycles, as compared to unpainted gypsum drywall giving 20 to 30 cycles of abuse resistance.

A series of setting-type coating compositions were prepared in the manner of Example 1 wherein the relative amount of aggregate and resin was varied as shown in Table 6. The coatings were applied to gypsum wallboard substrates in the manner of Example 1 and for each sample, the particles per square inch were determined and the film thickness was measured. The results are shown in Table 6.

TABLE 6

| No. | Aggregate % | Resin % | Particles/ square inch | Thickness (mils) | Abuse Resist. |
|-----|-------------|---------|----------------------------------|--------------------|---------------|
| 1 | 10.32 | 5.32 | 200 (31 per cm ²) | 26 (660 microns) | 5 |
| 2 | 18.7 | 4.82 | 473 (73 per cm ²) | 34 (864 microns) | 3 |
| 3 | 31.51 | 4.06 | 488 (76 per cm ²) | 25 (635 microns) | 5 |
| 4 | 9.71 | 10.1 | 224 (35 per cm ²) | 21.3 (541 microns) | 9 |
| 5 | 17.84 | 9.2 | 504 (78 per cm ²) | 33 (838 microns) | 9 |
| 6 | 30.28 | 7.8 | 608 (94 per cm ²) | 32 (813 microns) | 9 |

* Abuse Resistance defined as level of damage on 1-10 scale

- 5 (10=highly resistant) from data from ASTM D4977 (modified as described) at 540 cycles.

The data in Table 6 showed that the film thickness of the coating compositions that were applied and then smoothed using a float stayed within a fairly narrow range (i.e. from about 20 to about 35
10 mils (508 to 890 microns), even when the relative amount of aggregate (as reflected by the particle count) was varied over fairly wide limits.

A balance of properties is necessary to generate a preferred abuse resistant coating. Figure 1 is a graph of the relationship between the concentration of sand aggregate in coating compositions (percent by weight) and the ease of application / appearance (pattern uniformity) of the coating composition. "Application Ease/Appearance" shown in the graph is a subjective evaluation defined as the length of time required to produce an acceptable uniform finish. A rating of 1 requires extensive and prolonged troweling and smoothing with a float to produce a uniform finish. A rating of 10 requires minimum effort and time using a float to achieve a uniform finish. The target values are a rating of 6 or higher on the X-axis. Figure 1 shows that higher concentrations of aggregate result in improved ease of application and more uniform appearance.

Figure 2 is a graph of the relationship between the concentration of sand aggregate in coating compositions (percent by weight) and the abuse resistance of the coating composition. "Abuse Resistance" is a subjective evaluation defined as the resistance to damage when a coating subjected to 540 cycles in a modified ASTM D4977 test in which the sample is scrubbed back and forth by a wire brush (from 3M) under a load of 27.5 pounds (12.5 kg). A rating of 1 means continuous, immediate damage. A rating of 10 means the surface showed little or no visible damage. The target values are a rating of 6 or higher on the X-axis. Figure 2 shows that target values

for abuse resistance may be achieved over a wide range of sand aggregate concentrations. Thus for both abuse resistance and application ease / appearance, a higher sand aggregate concentration produces the best results.

- 5 Figure 3 is a graph of the relationship between the concentration of resin in coating compositions (percent by weight) and the ease of application / appearance (pattern uniformity) of the coating composition. Figure 3 shows that there is little if any distinction between high and low levels of resin usage. Figure 4 is a graph of the
- 10 relationship between the concentration of resin in coating compositions (percent by weight) and the abuse resistance of the coating composition. Figure 4 shows that the best abuse resistance comes at high resin concentrations. For best abuse resistance and application ease / appearance (uniformity), the most preferred coating
- 15 composition would be one that had high levels of resin and high levels of sand aggregate.

EXAMPLE 2

- 20 An abuse resistant coating composition of the drying type for float application was prepared in accordance with the formulation shown in Table 7.

| Component | | | Pounds (Wet) | Pounds (Dry) | Percent (Dry) |
|---------------------|------|------------|-------------------|-------------------|------------------|
| Silica | Sand | 30-50 mesh | 500 (227 kg) | 500 (227 kg) | 19.36 |
| Resin | | | 200 (91kg) | 116 (255 kg) | 4.49 |
| Calcium carbonate | | | 1550 (705 kg) | 1550 (705 kg) | 60.01 |
| Mica | | | 100 (45 kg) | 100 (45 kg) | 3.87 |
| Talc | | | 250 (114 kg) | 250 (114 kg) | 9.68 |
| Attapulgus clay | | | 50 (23 kg) | 50 (23 kg) | 1.94 |
| Cellulose thickener | | | 15 (6.8 kg) | 15 (6.8 kg) | 0.57 |
| Preservative | | | 2.0 (0.91 kg) | 2.0 (0.91 kg) | 0.08 |
| Water | | | 892 (405 kg) | | |
| Total Weight | | | 3559 (1618 kg) | 2583 (1174 kg) | 100.01 |

5 Sand 30-50, sold by Fairmount Minerals that contains 90% of the
particles between the designated screen sizes.

The resin was Halltech 41-355, a 58% solids polyvinyl acetate sold by Halltech Inc.

5

The attapulgis clay was Super Gel B sold by Milwhite.

10

The composition was prepared by blending the water, latex and preservatives. Dry ingredients were added to liquid fraction and blended for 5 minutes using a Hobart mixer. Sufficient water was added to achieve a viscosity of 400-500 Brabender Units (B.U.; as measured with a Pin Type Sensor using a Brabender Viscocorder equipped with a 250 cmg head). The product was packaged and set aside until time of use.

15

At the time of use, the material was also thinned to a viscosity of 300 B.U., and then applied onto FIBEROCK panels, smoothed using a plastic float and allowed to dry for 1 week. When dry, the coating had an average thickness of 0.035 inches (890 microns). There were about 300 to 500 aggregate particles per square inch (46 to 78 particles per cm^2).

Abuse resistance was determined by ASTM D4977 (modified).

Samples were cut from finished panels and were placed into a mechanical device used to scrub a wire brush (of a type available for this purpose from 3M) under a load of 27.5 lbs (12.5 kg) back and forth
5 over the surface of the test panels until the surface of the test panel showed damage that could not be concealed by paint. This level of abuse (abrasion) damage is given as the number of cycles (a cycle is one back and forth motion).

Compositions of the type shown in Example 2 generated cycles
10 of abrasion resistance in the range of 420 (drywall) to 660 (FIBEROCK) cycles, as compared to unpainted gypsum drywall giving 20-30 cycles of abuse resistance.

EXAMPLE 3

15 A sprayable, abuse resistant coating composition of the drying type was prepared in accordance with the formulation shown in Table 8.

TABLE 8

| Component | Pounds (Wet) | Pounds (Dry) | Percent (Dry) |
|--|--------------------|-------------------|------------------|
| Calcium Carbonate 30-50 mesh aggregate | 418 (190 kg) | 418 (190 kg) | 43.59 |
| Resin | 102 (46 kg) | 59 | 6.15 |
| Calcium carbonate filler | 475 (216 kg) | 475 (216 kg) | 49.54 |
| Cellulose thickener | 3.9 (1.8 kg) | 3.9 (1.8 kg) | 0.41 |
| pH Adjuster | 2 (0.91 kg) | 2 (0.91 kg) | 0.21 |
| Preservative | 1 (0.45 kg) | 1 (0.45 kg) | 0.1 |
| Water | 285 (130 kg) | | |
| Total Weight | 1001.9 (455 kg) | 958.9 (436 kg) | |

The calcium carbonate aggregate was Georgia Marble GM 30-50.

The resin was Halltech 41-355, a 58% solids polyvinyl acetate latex sold by Halltech, Inc.

The calcium carbonate filler was Snowwhite 21 sold by Omya / Pluess-Stauffer.

10 The cellulose thickener was Walocel MT 10000pv, a methylhydroxyethylcellulose sold by Wolff-Walsrode

The preservative was a mixture of equal parts by weight of

The composition was prepared by blending the water, latex and

5 preservatives. Dry ingredients were added to liquid fraction and
blended for 5 minutes using a KitchenAid mixer. Sufficient water was
added to achieve a viscosity of 300-400 Brabender Units (B.U.; as
measured with a Narrow Double Flag Sensor using a Brabender
Viscocorder equipped with a 250 cmg head). The product was
10 packaged and set aside until time of use.

At the time of use, the material was also thinned to a viscosity of 300 B.U., and was applied to a wallboard surface by spray application using a Binks 18D spraygun using a #56 fluid nozzle and #R24 fan cap, using 60psi (4.2 kg/cm²) atomizing air and 28psi (2.0 kg/cm²) material feed pressure. Samples were allowed to dry for 1 week. When dry, the coating had an average thickness of 0.039 inches (990 microns). There were about 600 to 1000 aggregate particles per square inch (93 to 155 per cm²).

Abuse resistance was determined by ASTM D4977 (modified).

20 Samples were cut from finished panels and were placed into a mechanical device used to scrub a wire brush (of a type available for this purpose from 3M) under a load of 27.5 lbs (12.5 kg) back and forth over the surface of the test panels until the surface of the test

panel showed damage that could not be concealed by paint. This level of abuse (abrasion) damage is given as the number of cycles (a cycle is one back and forth motion).

Compositions of the type shown in Example 3 generated cycles of abrasion resistance in the range of 700-900 cycles, as compared to unpainted gypsum drywall giving 20 to 30 cycles of abuse resistance.

A pair of sprayable abrasion resistant coating compositions were prepared in the manner of Example 3 wherein the relative amount of aggregate and resin was varied as shown in Table 8. The coatings were applied to substrates in the manner of Example 3 and for each sample, the particles per square inch were determined and the film thickness was measured. The results are shown in Table 8.

TABLE 8

| No. | Aggregate % | Resin % | Particles/ square inch | Thickness (mils) | Abrasion Resist.* |
|-----|-------------|---------|-----------------------------------|------------------------|-------------------|
| A | 43.63 | 6.17 | 720 (112 per cm ²) | 44.3 (1125 microns) | 9 |
| B | 39.37 | 7.19 | 933 (145 per cm ²) | 34.3 (871 microns) | 9 |

* Abrasion Resistance defined as level of damage on 1-10 scale (10=highly resistant) from data from ASTM D4977 (modified as described) at 540 cycles.

The data shown in Table 8 shows that the film thickness of the spray applied coating compositions is naturally somewhat thicker than the float application because the coating is not flattened by the action of the float, but remains within a fairly narrow range (i.e. from 30 to 50
5 mils (762 to 1270 microns)) even when the relative amount of aggregate (as reflected by the particle count) is varied over fairly wide limits.

The forms of invention shown and described herein are to be considered only as illustrative. It will be apparent to those skilled in
10 the art that numerous modifications may be made therein without departing from the spirit of the invention and the scope of the appended claims.

We Claim:

1. A self-gauging coating composition comprising a resin binder in which there is dispersed a quantity of aggregate particles passing a 30 mesh screen and retained on a 50 mesh screen, said
5 quantity being sufficient to form layer of aggregate particles having a thickness equal to, but not exceeding the size of the largest particles.

2. The self-gauging coating composition as described in claim 1, wherein said quantity being sufficient to form layer of aggregate particles that are closely spaced.

10 3. The self-gauging coating composition as described in claim 1, wherein said quantity of aggregate is sufficient to form layer of aggregate particles having a thickness from about 0.020 inches to about 0.050 inches.

4. The self-gauging coating composition as described in
15 claim 3, wherein said self-gauging composition is a setting-type composition and said quantity of aggregate is sufficient to form layer of aggregate particles having a thickness from about 0.020 inches to about 0.050 inches.

5. The self-gauging coating composition as described in
20 claim 1, wherein said self-gauging composition is a setting-type

composition containing from about 18 to about 48 percent by weight of said aggregate and from about 3 to about 9 percent by weight of resin.

6. The self-gauging coating composition as described in claim 5, wherein said composition contains about 30 percent by weight of said aggregate and about 8 percent by weight of resin.

7. The self-gauging coating composition as described in claim 1, wherein said self-gauging composition is a drying-type composition containing from about 18 to about 49 percent by weight of said aggregate and from about 3 to about 9 percent by weight of resin.

8. The self-gauging coating composition as described in claim 7, wherein said composition contains about 31 percent by weight of said aggregate and about 7 percent by weight of resin.

9. The self-gauging coating composition as described in claim 1, wherein said self-gauging composition is a sprayable-type composition and said quantity of aggregate is sufficient to form layer of aggregate particles having a thickness from about 0.030 inches to about 0.050 inches.

10. The self-gauging coating composition as described in claim 9, wherein said quantity of aggregate is sufficient to form layer of aggregate particles having an average thickness of about 0.039 inches.

11. The self-gauging coating composition as described in claim 1, wherein said self-gauging composition is a sprayable-type composition containing from about 30 to about 55 percent by weight of said aggregate and from about 5 to about 10 percent by weight of
5 resin.

12. The self-gauging coating composition as described in claim 11, wherein said composition contains about 44 percent by weight of said aggregate and about 6 percent by weight of resin.

13. The self-gauging coating composition as described in
10 claim 1, wherein said aggregate comprises calcium carbonate.

14. The self-gauging coating composition as described in claim 1, wherein quantity of aggregate is sufficient to form a layer containing about 200 to about 1000 particles of aggregate per square inch.

15 15. The self-gauging coating composition as described in claim 1, wherein said self gauging composition is a setting-type composition and quantity of aggregate is sufficient to form a layer having from about 450 to about 650 particles of aggregate per square inch.

20 16. The self-gauging coating composition as described in claim 1, wherein said self gauging composition is a drying-type

composition and quantity of aggregate is sufficient to form a layer having from about 300 to about 600 particles of aggregate per square inch.

17. The self-gauging coating composition as described in
- 5 claim 1, wherein said self gauging composition is a sprayable-type composition and said quantity of aggregate is sufficient to form a layer having from about 700 to about 1000 particles of aggregate per square inch.

ABSTRACT

ABSTRACT

Application Ease / Appearance Setting Type Float Finish

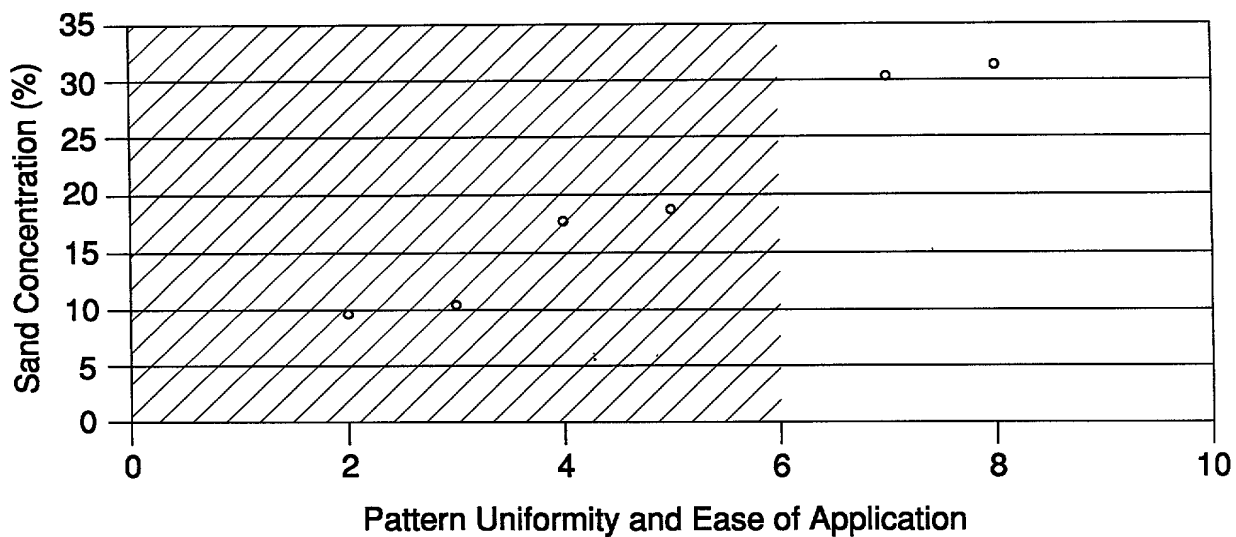


Figure 1

Abuse Resistance Setting Type Float Finish

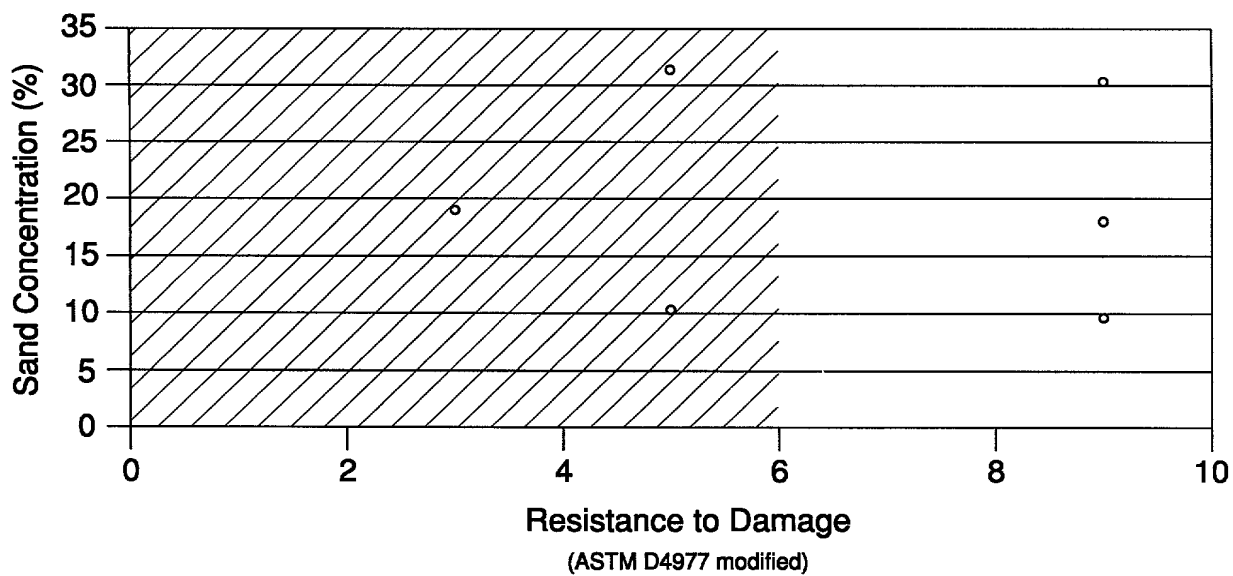


Figure 2

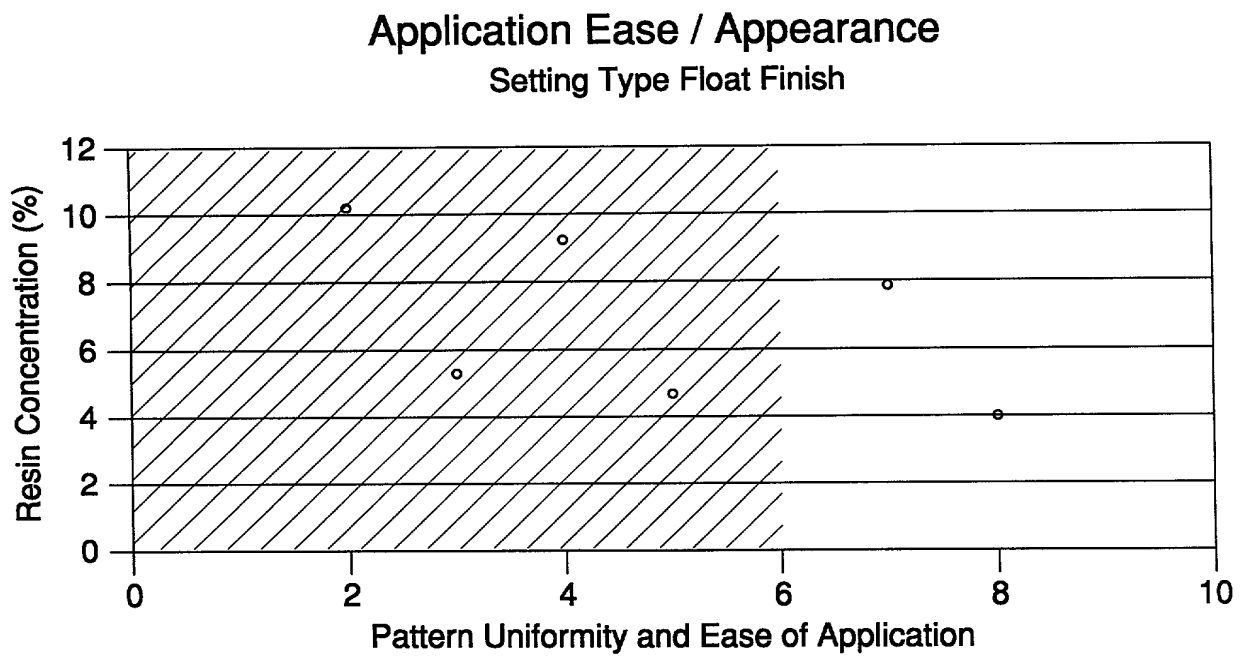


Figure 3

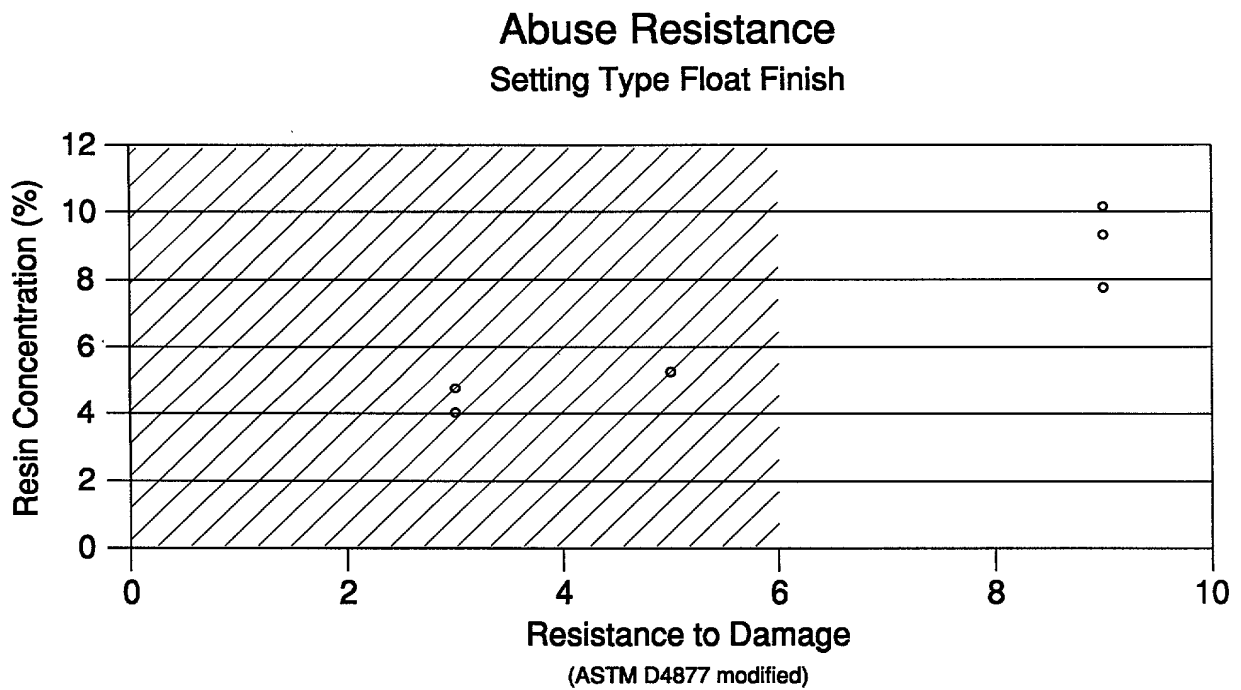


Figure 4

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

(check one applicable item below)

X original.

design.

supplemental.

NOTE., If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item, check appropriate one of last three items.

national stage of PCT.

NOTE If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.

divisional.

continuation.

continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: If the inventors are each not the inventors of all the claims, an explanation on of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (*if only one name is listed below*) or an original, first and joint inventor (*if plural names are listed below*) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

ABUSE-RESISTANT SKIM COATING COMPOSITION

SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b) or (c))

(a) ☒ is attached hereto.

NOTE: "The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed;

or

"(3) name of inventor(s), and title which was on the specification as filed"

Notice of July 13, 1995 (1177 O.G. 60)

(b) was filed on _____, as Serial No. 0__ / _____

or

and was amended on _____ (if applicable)

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67,

NOTE: "The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and application number (consisting of the series code and the serial number, e.g., 08/123,456);

"(2) name of inventor(s), serial number and filing date;

"(3) name of inventor(s) and attorney docket number which was on the specification as filed;

"(4) name of inventor(s), title which was on the specification as filed and filing date;

"(5) name of inventor(s), title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration; or

"(6) name of inventor(s), title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number, e.g., 08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration."

Notice of July 13, 1995 (1177 O.G. 60).

(c) was described and claimed in PCT International Application No.

_____, filed on _____ and as amended under PCT Article
19 on _____ (if any).

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

☒ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important In deciding whether to allow the application to issue as a patent, and

in compliance with this duty, there is attached an Information disclosure statement, in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. § 119(a)-(d))

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 (a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority Is claimed.

(complete (d) or (e))

- (d) ☒ no such applications have been filed.
(e) such applications have been filed as follows.

NOTE: Where item (e) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)**

| COUNTRY (OR INDICATE IF PCT) | APPLICATION NUMBER | Date of Filing (day, month, year) | PRIORITY CLAIMED UNDER 35 USC §119 | |
|------------------------------------|--------------------|--------------------------------------|---------------------------------------|----|
| | NONE | | YES | NO |
| | | | YES | NO |
| | | | YES | NO |
| | | | YES | NO |
| | | | YES | NO |

**CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(35 U.S.C. § 119(e))**

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER

FILING DATE

_____/_____

_____/_____

_____/_____

**CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)
UNDER 35 U.S.C. §120**

The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN PART (C-1-P) APPLICATION

000217 25631250

**ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-1-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S. C. §120.

POWER OF ATTORNEY

I hereby appoint the following attorney to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

| | |
|------------------|-------------------------|
| Donald E. Egan | Registration No. 19,691 |
| John M. Lorenzen | Registration No. 25,889 |
| David F. Janci | Registration No. 28,620 |

(check the following Item, if applicable)

Attached, as part of this declaration and power of attorney, is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO:

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

Donald E. Egan
Attorney at Law
17 West 200 22nd Street
Oakbrook Terrace, IL 60181
Registration Number 19691

Donald E. Egan
Telephone Number (630) 782-1900

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or Imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Figure 1: Schematic representation of the experimental design. The figure is divided into two main sections: 'Pre-treatment' and 'Treatment'. The 'Pre-treatment' section includes 'Baseline' and 'Pre-treatment' phases. The 'Treatment' section includes 'Treatment' and 'Post-treatment' phases. The 'Pre-treatment' section shows a timeline from 0 to 10 minutes, with 'Baseline' at 0 minutes and 'Pre-treatment' at 10 minutes. The 'Treatment' section shows a timeline from 0 to 10 minutes, with 'Treatment' at 0 minutes and 'Post-treatment' at 10 minutes. The 'Pre-treatment' section shows a timeline from 0 to 10 minutes, with 'Baseline' at 0 minutes and 'Pre-treatment' at 10 minutes. The 'Treatment' section shows a timeline from 0 to 10 minutes, with 'Treatment' at 0 minutes and 'Post-treatment' at 10 minutes.

Full name of sole or first Inventor

Inventor's signature: Thomas G. Hounar
Date: November 17, 2000 Country of Citizenship: U.S.

Full name of second joint Inventor, if any

Inventor's signature: 
Date: November 17, 2000 Country of Citizenship: U.S.

Full name of third joint Inventor, if any

Inventor's signature: Theresa A. Falls
Date: 11/15/00 Country of Citizenship: U.S.

Residence: Illinois
Post Office Address: 471 Elmhurst, Woodale, IL 60191

| Variable | Mean | SD | Min | Max |
|-------------------------------------|------|------|-----|-----|
| Age | 34.5 | 10.2 | 21 | 55 |
| Gender | 0.5 | 0.5 | 0 | 1 |
| Marital status | 0.6 | 0.5 | 0 | 1 |
| Education | 12.5 | 1.5 | 9 | 16 |
| Income | 1.2 | 0.8 | 0.5 | 2.5 |
| Health status | 0.7 | 0.4 | 0 | 1 |
| Stress level | 3.5 | 1.2 | 1 | 5 |
| Life satisfaction | 4.2 | 0.8 | 3 | 5 |
| Work engagement | 3.8 | 0.9 | 2 | 5 |
| Organizational commitment | 4.1 | 0.7 | 3 | 5 |
| Job satisfaction | 4.3 | 0.6 | 3 | 5 |
| Turnover intention | 0.8 | 0.4 | 0 | 1 |
| Organizational citizenship behavior | 3.9 | 0.8 | 2 | 5 |
| Employee well-being | 4.0 | 0.7 | 3 | 5 |
| Work-life balance | 3.7 | 0.9 | 2 | 5 |
| Job design | 3.6 | 0.8 | 2 | 5 |
| Supervisor support | 4.2 | 0.6 | 3 | 5 |
| Peer support | 4.1 | 0.7 | 3 | 5 |
| Organizational support | 4.3 | 0.5 | 3 | 5 |
| Job security | 4.4 | 0.4 | 3 | 5 |
| Compensation | 4.0 | 0.6 | 3 | 5 |
| Benefits | 4.1 | 0.5 | 3 | 5 |
| Work environment | 4.2 | 0.6 | 3 | 5 |
| Job autonomy | 4.3 | 0.5 | 3 | 5 |
| Job variety | 4.4 | 0.4 | 3 | 5 |
| Job challenge | 4.5 | 0.3 | 3 | 5 |
| Job growth | 4.6 | 0.2 | 3 | 5 |
| Job learning | 4.7 | 0.1 | 3 | 5 |
| Job development | 4.8 | 0.1 | 3 | 5 |
| Job advancement | 4.9 | 0.1 | 3 | 5 |
| Job promotion | 5.0 | 0.1 | 3 | 5 |
| Job recognition | 5.1 | 0.1 | 3 | 5 |
| Job appreciation | 5.2 | 0.1 | 3 | 5 |
| Job respect | 5.3 | 0.1 | 3 | 5 |
| Job dignity | 5.4 | 0.1 | 3 | 5 |
| Job honor | 5.5 | 0.1 | 3 | 5 |
| Job prestige | 5.6 | 0.1 | 3 | 5 |
| Job status | 5.7 | 0.1 | 3 | 5 |
| Job title | 5.8 | 0.1 | 3 | 5 |
| Job role | 5.9 | 0.1 | 3 | 5 |
| Job function | 6.0 | 0.1 | 3 | 5 |
| Job department | 6.1 | 0.1 | 3 | 5 |
| Job division | 6.2 | 0.1 | 3 | 5 |
| Job section | 6.3 | 0.1 | 3 | 5 |
| Job team | 6.4 | 0.1 | 3 | 5 |
| Job group | 6.5 | 0.1 | 3 | 5 |
| Job unit | 6.6 | 0.1 | 3 | 5 |
| Job branch | 6.7 | 0.1 | 3 | 5 |
| Job office | 6.8 | 0.1 | 3 | 5 |
| Job location | 6.9 | 0.1 | 3 | 5 |
| Job site | 7.0 | 0.1 | 3 | 5 |
| Job area | 7.1 | 0.1 | 3 | 5 |
| Job zone | 7.2 | 0.1 | 3 | 5 |
| Job region | 7.3 | 0.1 | 3 | 5 |
| Job district | 7.4 | 0.1 | 3 | 5 |
| Job county | 7.5 | 0.1 | 3 | 5 |
| Job city | 7.6 | 0.1 | 3 | 5 |
| Job town | 7.7 | 0.1 | 3 | 5 |
| Job village | 7.8 | 0.1 | 3 | 5 |
| Job hamlet | 7.9 | 0.1 | 3 | 5 |
| Job settlement | 8.0 | 0.1 | 3 | 5 |
| Job community | 8.1 | 0.1 | 3 | 5 |
| Job neighborhood | 8.2 | 0.1 | 3 | 5 |
| Job district | 8.3 | 0.1 | 3 | 5 |
| Job ward | 8.4 | 0.1 | 3 | 5 |
| Job subdistrict | 8.5 | 0.1 | 3 | 5 |
| Job township | 8.6 | 0.1 | 3 | 5 |
| Job county | 8.7 | 0.1 | 3 | 5 |
| Job city | 8.8 | 0.1 | 3 | 5 |
| Job town | 8.9 | 0.1 | 3 | 5 |
| Job village | 9.0 | 0.1 | 3 | 5 |
| Job hamlet | 9.1 | 0.1 | 3 | 5 |
| Job settlement | 9.2 | 0.1 | 3 | 5 |
| Job community | 9.3 | 0.1 | 3 | 5 |
| Job neighborhood | 9.4 | 0.1 | 3 | 5 |
| Job district | 9.5 | 0.1 | 3 | 5 |
| Job ward | 9.6 | 0.1 | 3 | 5 |
| Job subdistrict | 9.7 | 0.1 | 3 | 5 |
| Job township | 9.8 | 0.1 | 3 | 5 |
| Job county | 9.9 | 0.1 | 3 | 5 |
| Job city | 10.0 | 0.1 | 3 | 5 |

X Signature for fourth and subsequent joint Inventors. *Number of pages added* 1.

Signature by administrator(trix), executor(trix) or legal representative for deceased or incapacitated Inventor. *Number of pages added* _____

Signature for Inventor who refuses to sign or cannot be reached by person authorized under 37 CFR §1.47. *Number of pages added* _____

Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR §1.47)

Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

Number of pages added _____

Authorization of attorney(s) to accept and follow instructions from representative.

*(If no further pages form a part of this Declaration,
then end this Declaration with this page and check the following item)*

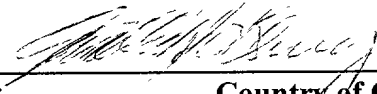
This declaration ends with this page.

SIGNATURE(S)

NOTE., Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents

Full name of fourth Inventor, if any

Timothy G. Kenny
(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)

Inventor's signature: 
Date: 11/2/00 Country of Citizenship: U.S.

Residence: Illinois
Post Office Address: 625 Meadow Lane, Libertyville, IL 60048

Full name of fifth joint Inventor, if any

(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)

Inventor's signature: _____
Date: _____ Country of Citizenship: _____
Residence: _____
Post Office Address: _____

Full name of sixth joint Inventor, if any

(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)

Inventor's signature: _____
Date: _____ Country of Citizenship: _____
Residence: _____
Post Office Address: _____

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